COMP9444 Neural Networks and Deep Learning
Session 2, 2018

Exercises 1: Perceptrons

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1. **Perceptron Learning**

   a. Construct by hand a Perceptron which correctly classifies the following data; use your knowledge of plane geometry to choose appropriate values for the weights w_0, w_1 and w_2.

Training Example	x_1	x_2	Class
a.	0	1	-1
b.	2	0	-1
c.	1	1	+1

   b. Demonstrate the Perceptron Learning Algorithm on the above data, using a learning rate of 1.0 and initial weight values of

   $w_0 = -1.5$
   $w_1 = \ \ \ 0$
   $w_2 = \ \ \ 2$

   In your answer, you should clearly indicate the new weight values at the end of each training step.

2. **XOR Network**

   Construct by hand a Neural Network (or Multi-Layer Perceptron) that computes the XOR function of two inputs. Make sure the connections, weights and biases of your network are clearly visible.

   Challenge: Can you construct a Neural Network to compute XOR which has only one hidden unit, but also includes shortcut connections from the two inputs directly to the (one) output.
   Hint: start with a network that computes the inclusive OR, and then try to think of how it could be modified.

Make sure you try answering the Exercises yourself, before checking the Sample Solutions